UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/521,628	09/08/2005	Neville Boden	5585-70293-01	2023

24197 7590 08/08/2007
KLARQUIST SPARKMAN, LLP
121 SW SALMON STREET
SUITE 1600
PORTLAND, OR 97204

EXAMINER	
HA, JULIE	

ART UNIT	PAPER NUMBER
1654	

MAIL DATE	DELIVERY MODE
08/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/521,628	BODEN ET AL.	
	Examiner	Art Unit	
	Julie Ha	1654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *See Continuation Sheet* is/are pending in the application.

4a) Of the above claim(s) *See Continuation Sheet* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,11,13,17,19,23,24,28,38,41,45 and 96* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims pending in the application are 1-13,17,19-21,23,24,28,29,36-38,41-58,61,63,69,71-73,76,81 and 96.
Continuation of Disposition of Claims: Claims withdrawn from consideration are 7-10,12,20,21,29,36,37,42-44,46-58,61,63,69,71-73,76 and 81.

DETAILED ACTION

Response to Election/Restriction filed on May 29, 2007 is acknowledged. The Applicant's informed the Examiner that the Applicant elected Group 3 not Group 1 in Applicant Arguments/Remarks filed on May 29, 2007. The previous office action mailed out on June 27, 2007 is vacated. The new office action follows below. Claims 1-13, 17, 19-21, 23-24, 28-29, 36-38, 41-58, 61, 63, 69, 71-73, 76, 81 and 96 are pending in this application.

Restriction

1. Applicant's election with traverse of Group 3 (claims 2, 13 and 37 with the linking claims 1, 3-7, 9-10, 12, 19, 23-24, 36, 38, 41-58, 71-73, 76, 81 and 96) drawn to a peptide material comprising ribbons or fibrils/fibres in beta-sheet tape-like structure, antiparallel conformation of P11-3 peptide and the first method drawn to a method of tissue engineering in the reply filed on May 29, 2007 is acknowledged. The traversal is on the ground(s) that the peptide disclosed in Aggeli et al (Nature, 1997, 386: 259-262) does not disclose the specific claimed class of peptides restricted to a net +/- 2 charge at physiological pH. The Applicant argue that as described in the specification on page 8, lines 5-19, the specific charge confers the special property of self-assembly which is not found with net charges of +/- 3 or 4. This is not found persuasive because the inventions restricted are patentably distinct. Aggeli et al (Nature, 1997, 386: 259-262) discloses peptide sequence of P11-2 (QQRFQWWQFEQQ) and the proposed antiparallel beta-sheet arrangement of two molecules of the de novo peptide DN1 that

indicates +2 and –2 net charge at neutral pH (see p. 261, left column, 2nd paragraph, and Figure 4). Since the Aggeli art teaches the peptide, it would inherently have the claimed peptide functions and properties. Additionally, the peptides claimed share only the core sequence "QQ". Four out of the 7 peptides share the core sequence "QQR"; three of the 7 peptides share the core sequence "QQRF"; two of the 7 peptides share the core sequence "QQOF". This requires independent searches. The search for each of the inventions is not co-extensive particularly with regard to the literature search. Burden consists not only of specific searching of classes and subclasses, but also of searching multiple databases for foreign references and literature searches. Burden also resides in the examination of independent claim sets for clarity, enablement, and double patenting issues. Further, a reference that would anticipate the invention of one group would not necessarily anticipate or even make obvious another group. Finally, the consideration for patentability is different in each case. Thus, it would be an undue burden to examine all of the above inventions in one application and the restriction for examination purposes as indicated above is deemed proper.

The requirement is still deemed proper and is therefore made FINAL. Search was conducted on the elected invention, peptide P11-3, and a prior art was found. Thus, claims 7-10, 12, 20-21, 29, 36, 37, 42-44, 46-58, 61, 63, 69, 71-73, 76 and 81 are withdrawn from further consideration. Claims 1-6, 11, 13, 17, 19, 23-24, 28, 38, 41, 45 and 96 are examined on the merits in this office action.

Objection-Specification

2. The specification is objected to because of the following informalities: The arrangement of the specification is not outlined as below.

Appropriate correction is required.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
    (1) Field of the Invention.
    (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

3. The specification is objected to because of the following informalities: The title of Example 3 recites "A Rationally-Designed Self-Assembling Peptide P11-4...". However,

Example 3 provides description on P11-5 (see paragraphs [0014]-[0016]). Additionally, Example 3 refers back to the incorrect example numbers. P11-3 is described in example 2 not example 1; P11-5 is described in example 3 not example 2 (see paragraph [0015]).

Rejection-35 U.S.C. 112, 2nd

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 3, 4 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 1 recites "wherein each peptide or pair of complimentary peptides comprises a net –2 or a +2 charge when in solution at physiological pH". This statement is unclear. For example, when looking at peptide P11-1 (QQRQQQQQEQQ), there is a +1 and –1 charges each from R and E, respectively. This would give a "net" charge of "0". If from each peptide, there is a net charge of "0". If a pair of complimentary peptides is involved, it would still give +2 and –2 charges each, and this leads to net charge of "0". So it is unclear as how the "net charge" is acquired, i.e., if the net charge is the final charge acquired at when the network of ribbons, fibrils or fibres are formed or if each individual peptide or pair of peptides give the "net charge".

7. Claim 4 recites "the material according to claim 3, wherein the ratio of polar/neutral amino acids to charged amino acids is from 11:1 to 11:3". It is unclear how

a peptide having 11 amino acids can give a ratio of polar/neutral amino acids to charged amino acids of 11:1 to 11:3. This implies that there is at least 12 amino acids or 14 amino acids in a sequence.

Rejection-35 U.S.C. 112, 1st

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1, 3-6, 11, 17, 19, 23-24, 28, 38, 41, 45 and 96 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The MPEP states that the purpose of the written description requirement is to ensure that the inventor had possession, as of the filing date of the application, of the specific subject matter later claimed by him. The courts have stated:

"To fulfill the written description requirement, a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude that "the inventor invented the claimed invention." Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (1997); In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) (" [T]he description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). Thus, an applicant complies with the written description requirement "by describing the invention, with all its claimed limitations, not that which makes it obvious," and by using "such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention." Lockwood, 107 F.3d at 1572, 41 USPQ2d at 1966." Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

10. The MPEP lists factors that can be used to determine if sufficient evidence of possession has been furnished in the disclosure of the Application. These include "level

of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with a known or disclosed correlation between structure and function, and the method of making the claimed invention. Disclosure of any combination of such identifying characteristics that distinguish the claimed invention from other materials and would lead one of skill in the art to the conclusion that the applicant was in possession of the claimed species is sufficient." MPEP 2163.

11. Further, for a broad generic claim, the specification must provide adequate written description to identify the genus of the claim. In Regents of the University of California v. Eli Lilly & Co., the court stated:

> "A written description of an invention involving a chemical genus, like a description of a chemical species, 'requires a precise definition, such as by structure, formula, [or] chemical name,' of the claimed subject matter sufficient to distinguish it from other materials. Fiers, 984 F.2d at 1171, 25 USPQ2d at 1606; In re Smythe, 480 F.2d 1376, 1383, 178 USPQ 279, 284-85 (CCPA 1973) ("In other cases, particularly but not necessarily, chemical cases, where there is unpredictability in performance of certain species or subcombinations other than those specifically enumerated, one skilled in the art may be found not to have been placed in possession of a genus. . . ."). Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

12. The MPEP further states that if a biomolecule is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is "not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence." MPEP 2163. The MPEP does state that for generic claim the genus can be adequately described if the disclosure presents a sufficient number of representative species that encompass the genus. MPEP 2163. If the genus has a substantial variance, the disclosure must describe a sufficient variety of species to reflect the variation within that genus. See MPEP 2163. Although the MPEP does not define what constitute a sufficient number of

representative, the Courts have indicated what do not constitute a representative number species to adequately describe a broad generic. In Gostelli, the Court determined that the disclosure of two chemical compounds within a subgenus did not describe that subgenus. In re Gostelli, 872 F.2d at 1012, 10 USPQ2d at 1618.

13. In the instant case, the claims are drawn to a material comprising ribbons, fibrils or fibres having an antiparallel arrangement of peptides in a beta-sheet tape-like substructure. The generic statements material comprising ribbons, fibrils or fibres in a beta-sheet tape-like substructure does not provide ample written description for the compounds since the claims do not describe a single structural feature. The specification does not clearly define or provide examples of what qualify as compounds of the claimed invention.

14. As stated earlier, the MPEP states that written description for a genus can be achieved by a representative number of species within a broad generic. It is unquestionable claim 1 is broad generics with respect all possible compounds encompassed by the claims. The possible structural variations are limitless to any class of peptide or a peptide-like molecule that can form ribbons, fibrils or fibres in an antiparallel arrangement. It must not be forgotten that the MPEP states that if a peptide is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is "not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence." MPEP 2163. Here, though the claims may recite some functional characteristics, the claims lack written description because there is no disclosure of a

correlation between function and structure of the compounds beyond compounds disclosed in the examples in the specification. Moreover, the specification lack sufficient variety of species to reflect this variance in the genus since the specification does not provide any examples of derivatives. The specification is void of organic molecules that functions as a peptide-like molecule that qualify for the functional characteristics claimed as a peptide or a peptide-like molecule or other peptidic molecules that can form antiparallel arrangements in a beta-sheet tape-like substructure.

15. The specification is limited to the peptide or peptide-like molecules that have 1 to 3 charged amino acids per 11 amino acids (see paragraph [0014]). The examples disclosed are peptides P11-1, P11-2, P11-3, P11-4, P11-5, P11-6 and an 10mer P10-7. The working example describes the peptide P11-3 in 145 mM NaCl, pH 7.5, self-assembling into twisted beta-sheet fibrils (see Example 2); peptide P11-5 in 145 mM NaCl, pH 7.5, self-assembling into twisted beta-sheet fibrils (see Example 3). The working example only describes P11-1, P11-2, P11-3, P11-4, P11-5, P11-6 and P10-7 (see Examples 2-10). The specification does not describe any other peptides or any other type of peptide or peptide-like molecule that can form an antiparallel arrangement of peptides in a beta-sheet tape-like substructure. Descriptions of P11-1, P11-2, P11-3, P11-4, P11-5, P11-6 and P10-7 are not sufficient to encompass numerous other peptides that belong to the same genus. For example, there are five charged amino acids (D, E, H, K and R) and there are multiple polar/neutral amino acids. Additionally, there are non-natural amino acids, such as D-amino acids or beta-amino acids, which have charged functional groups and have polar/neutral functionality. Additionally, there

are varying lengths, varying amino acid compositions, and numerous distinct qualities that make up the genus. Additionally, the longer peptides having certain amino acids positioned in certain positions that can have the same antiparallel arrangement (for example, Lys□-21 peptide). There are 20 naturally occurring amino acids that can be utilized in a sequence to have the same functional characteristics as the claimed peptides. Since innumerable peptide possibilities can be utilized, there is not sufficient amount of examples provided to encompass the numerous characteristics of the whole genus claimed.

16. The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention. See In re Wilder, 736 F.2d 1516, 1521, 222 USPQ 369, 372-73 (Fed. Cir. 1984) (affirming rejection because the specification does "little more than outlin[e] goals appellants hope the claimed invention achieves and the problems the invention will hopefully ameliorate"). Accordingly, it is deemed that the specification fails to provide adequate written description for the genus of the claims and does not reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the entire scope of the claimed invention.

Rejection-35 U.S.C. 102

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 1-6, 11, 13, 17, 19, 23, 24, 28, 38, 41, 45 and 96 are rejected under 35 U.S.C. 102(b) as being anticipated by Aggeli et al (Peptide Science, Present and Future, 1999, 30-33).

19. The instant claims are drawn to a material comprising ribbons, fibrils or fibres, wherein each of the ribbons, fibrils or fibres have an antiparallel arrangement of peptides in a beta-sheet tape-like substructure having a net –2 or a +2 charge when in solution at physiological pH. Furthermore, the claims are drawn to a self assembling peptide (SAP), wherein the SAP forms a tape in an aqueous medium and is made up of 3 or more polar/neutral amino acids and a plurality of charged amino acids.

20. Aggeli et al teach that the production of de novo, self-assembling, beta-sheet, tape-forming oligopeptides. These are (i) highly co-operative intermolecular hydrogen bonds, (ii) cross-strand attractive forces (hydrophobic, electrostatic, hydrogen bonding) between side-chains, (iii) tape-tape repulsive forces to prevent aggregation, (iv) lateral recognition between adjacent beta-strands to constrain their self-assembly to one-dimension, and (v) strong adhesion of solvent to the surface of the tapes to control solubility. Furthermore, the reference teaches that the produced de novo oligopeptides which self-assemble in water into polymeric, beta-sheet tapes microns in length, and at peptide concentrations above 5 mg/ml, the polymeric tapes, become entangles to produce a continuous, three-dimensional network, which transforms the initially fluid solution into a homogeneous self-supporting gel (see p. 30, 1st and 2nd paragraph in

Results and Discussion). The reference further teaches an 11-mer peptide DN1-2E (QQRFEWEFEQQ) that is designed so that its self-assembly is responsive to pH. At pH values less than 4, the peptide molecules self-assemble into stable beta-sheet structures and form gel (see p. 30, 3rd paragraph in Results and Discussion and Figure 1). This peptide has the same sequence as P11-3. The peptide is made up of 3 or more polar/neutral amino acids and a plurality of charged amino acids, has glutamine, glutamic acid, form a gel at a pH of less than at neutral pH, at least 50% of the amino acids comprise an alternating structure of polar and apolar amino acids, forms a tape in an aqueous medium, has phenylalanine and tryptophan residues. Thus, this meets the limitation of claims 1-6, 11, 13, 17, 19, 23-24, 28, 38, 41, 45 and 96. Furthermore, the reference discloses that it is interesting to compare the properties of these self-assembling peptide gels with the more classical biopolymer gels such as gelatin and agarose. The elastic and dissipative moduli are very similar. The stress response to strain for a peptide gel remains linear up to 230% strain, compared to conventional biopolymer gels which typically break at strains of 50%. The gels also show high thermal and chemical stability, and tare both biodegradable and biocompatible, and are found to be stable in the presence of a variety of solutes, including biological proteins. Furthermore, the reference discloses that this combination of properties of the polymeric peptide tapes, coupled with the ability to engineer functionality into the polymer by peptide design, make these materials attractive for the development of a wide range of applications. Switching between gel and fluid states may be used for drug delivery, where the drug molecule encapsulated in the polymeric gel network is released in

response to a switch in pH (see p. 32, 2nd and 3rd paragraphs). Furthermore, the peptide DN1-2E having the same peptide sequence as claimed would have inherent properties and functionalities as P11-3. Thus, this meets the limitations of claims 1-6, 11, 13, 17, 19, 23-24, 28, 38, 41, 45 and 96.

Conclusion

21. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julie Ha whose telephone number is 571-272-5982. The examiner can normally be reached on Mon-Fri, 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cecilia Tsang can be reached on 571-272-0562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Julie Ha
Patent Examiner
AU 1654

8/6/08
ANISH GUPTA
PRIMARY EXAMINER